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Cover Page Footnote

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Measurement of Childhood Poverty in the United States and Its Enduring Influences

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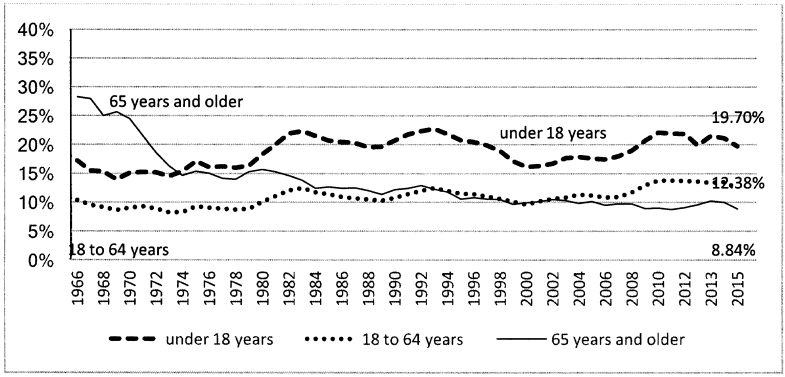
This paper measures childhood poverty in the United States and classifies it into three degrees based on different durations—persistent poverty, chronic transient poverty, and non-chronic transient poverty—using the Panel Study of Income Dynamics (PSID) data and actual poverty thresholds in the United States. Then I examine the enduring influences of different types of childhood poverty on future performance, including academic achievement, income, and criminal behavior, utilizing OLS and logistic models as well as Mincer wage functions. The regression results show that childhood poverty has a negative impact on schooling years and earnings. Living in poverty increases the likelihood of committing criminal behavior. In addition, longer spells of childhood poverty, especially persistent poverty, are shown to have stronger enduring influences compared with other types of childhood poverty. Meanwhile, while no prior studies examine the impact of short-term childhood poverty, this study shows that even a short duration of childhood poverty (non-chronic transient poverty) is associated with shorter school years completed and a higher risk of committing crime. However, it has no significant impact on adult earnings.

Keywords: durations of childhood poverty, persistent poverty, chronic transient poverty, non-chronic transient poverty, enduring impact, future performance

Childhood poverty refers to an individual experiencing poverty during childhood. It has been a worldwide issue that needs to be addressed. In the United States, the childhood poverty rate has been persistently high. Figure 1 shows the poverty rates by age in the United States: from the graph we can see that since 1975, the poverty rate for those under 18 years old has exceeded the poverty rates among other age groups. In 2015, the childhood poverty rate in the United States was almost 20%, which was 7.3 percentage points higher than the poverty rate among people between 18 to 64 years old, and 10.9 percentage points higher than the poverty rate among people 65 years and older. The high childhood poverty rate in the United States indicates that more attention should be addressed to the problem, and new policies need to be adopted to deal with the current situation.

Figure 1. Poverty Rates by Age in United States from 1966 to 2015



Data Source: U.S. Census of Bureau, Historical Poverty Tables: People and Families, 2016

It has been shown repeatedly that economic status in early life has a profound impact on future well-being. Much research has demonstrated that childhood poverty has a strong and lasting influence on later life. Compared with children who grow up in a non-poor family, children who live in a poor family will face a higher incidence of poor academic performance and achievement, behavioral problems, adverse physical health, and less success in adulthood (Brooks-Gunn & Duncan, 1997; Duncan, Brooks-Gunn, & Klebanov, 1994; Duncan, Yeung, Brooks-Gunn, & Smith, 1998; Mayer, 2002). However, very little research studies the effects of different durations of childhood poverty. Therefore, an in-depth study of childhood poverty based on different durations and its lasting impact is very necessary. Moreover, prior studies measured childhood poverty by comparing the average income during childhood with a fixed poverty line (Duncan, Ziol-Guest, & Kalil, 2010). However, as the poverty threshold in the United States (reported annually by the U.S. Census Bureau) changes annually based on inflation, and given that families of different sizes face different poverty thresholds, using a fixed poverty threshold is not the most accurate method to measure poverty. This research will complement studies in this field, by not only establishing a detailed classification of childhood poverty based on different durations and the actual poverty line in the United States, but also by investigating how different durations of childhood poverty may have lasting influences on adult performance.

The paper begins with a literature review. Then, in the next section, based on different durations, I measure and classify childhood poverty in the United States into three degrees: persistent, chronic transient, non-chronic transient. After that, using Panel Study of Income Dynamics (PSID) data from 1968 to 2013, I estimate the long-term influences of childhood poverty on academic achievement, criminal behaviors, and income.

Enduring Influences of Childhood Poverty

Various studies show how childhood poverty has a lasting impact. Childhood poverty has been shown to be associated with academic performance and achievement. Duncan et al. (2010) conducted a longitudinal study using data from the Panel

Study of Income Dynamics (PSID), and found that experiencing poverty before the age of five predicted poorer school performance and lower education attainment. Smith, Brooks-Gunn, and Klebanov (1997) used data from the National Longitudinal Survey of Youth (NLSY) and Infant Health and Development Program (IHDP) to study childhood poverty. Their results suggested that for tests regarding IQ and cognitive abilities, children who lived in families with income lower than half of the poverty threshold scored 6 to 13 points lower than those who were from richer families. Also, they concluded that longer-term poverty has a more significant impact on cognitive ability than short-term poverty, which is consistent with the work of Korenman, Miller, and Sjaastad (1995). Haveman and Wolfe (1995) argue that poverty limits one's school achievement. Their study showed that a 10% increase in family income predicted a 0.2% to 2% increase in the number of school years completed. Dahl and Lochner (2005) further suggested that that an increase in family income in childhood is positively associated with adult reading and math achievements. Other research also found that poverty has a negative impact on years of completed school as well as on high school graduation rates (Brooks-Gunn & Duncan, 1997; Haveman & Wolfe, 1994; Teachman, Paasch, Day, & Carver, 1997).

Childhood poverty has an impact on adult economic attainment and success. Duncan et al. (2010) concluded that poverty in early childhood is a significant predictor of adult earnings and work hours, which are two very important components of adult economic attainment. This is consistent with the work of Brooks-Gunn and Duncan (1997). Holzer, Whitmore Schanzenbach, Duncan, and Ludwig (2008) estimated that people who grew up in poverty would have earnings 0.49 log points lower than those in the median household, and people who grew up in persistently poor families were likely to have less income as adults. Mayer (1997) suggested that if family income doubles during childhood for those below the poverty line, the earnings of their children will increase. Zimmerman (1992) arrives at instrumental-variable estimates using National Longitude Survey data and shows a 0.4 correlation between the lifetime earnings of father and son. Corcoran and Adams (1997) and Solon (1992) also studied intergenerational income mobility in the United

States, and concluded that the parents' income had an impact on that of their children.

Additionally, researchers have found that childhood poverty is associated with future behavioral issues. Duncan et al. (1994) concluded that both short-term and long-term childhood poverty are related to more behavioral problems. Duncan et al. (2010) argue that adolescent poverty is a predicator of adult psychological distress, as well as arrests. Bjerk (2004) found household income to be significantly negatively related to youth participation in crimes. Compared with youth from the richest third of the wealth distribution of families, those from the poorest third of the wealth distribution had a 65 percent higher chance of committing serious crimes. Jarjoura, Triplett, and Brinker (2002) showed that persistent poverty was a strong factor associated with delinquency, and this finding was confirmed in other studies (Duncan et al., 1994; Korenman et al., 1995; Mazumder, 2008; McLeod & Shanahan, 1993).

Childhood poverty also impacts future health, both physical and mental. Duncan et al. (2010) suggested that compared with children whose family income is twice the poverty line, children who grow up in poverty will be twice as likely to have poorer health or higher levels of distress. Meanwhile, their estimates showed that poorer children were 50 percent more likely to be overweight when adults. Blane, Bartley, and Smith (1997) argued that poverty in childhood increases the occurrence of diseases in adulthood and decreases life span. Evans and Kim (2007) found a linkage between duration of poverty and health. Their results suggested that a longer time living in poverty increased the risk of obesity morbidity and stress dysregulation. A series of other studies have also examined the impact of childhood poverty on physical and mental health in adulthood (Blackwell, Hayward, & Crimmins, 2001; Evans & Schamberg, 2009; Poulton & Caspi, 2005).

Yet, the studies of how different durations of childhood poverty impact future life are still few and dated. Additionally, prior researchers only look at the influence of persistent poverty (Jarjoura et al., 2002), and none of them investigate the effect of non-persistent childhood poverty. Also, when prior studies measured childhood poverty, most of them compared the average income during childhood with a fixed poverty line and

define an individual as poor when the average income is below the poverty line (Duncan et al., 2010). But, in reality, the poverty measurement in the United States is far more complicated.

Each year around September, the Census Bureau releases reports to determine poverty in the United States by comparing pre-tax income against a poverty threshold, which is the minimum living cost for a household to survive. The poverty threshold is calculated using three times the cost of a minimum food diet in 1963 in today's prices, adjusted for different family sizes. The Census Bureau updates the poverty threshold annually for inflation using the Consumer Price Index (CPI), and adjusts for family size, composition, and age of householder. As the poverty threshold in the United States varies every year with inflation, and families with different sizes will have different poverty thresholds, just using average income over several years against a fixed income line in the previous research is not appropriate. This paper helps to address these gaps, by establishing a detailed classification of childhood poverty based on different durations and the actual poverty thresholds in the United States, and investigating how different durations of childhood poverty will have different lasting influences during adulthood.

Methods

To study how different durations of childhood poverty have different lasting impacts, this research follows a two-step approach: first, it measures and classifies childhood poverty into three degrees according to different durations: persistent, chronic transient, and non-chronic transient; secondly, it applies statistical models to examine the impacts of different types of childhood poverty on education, criminal behavior, and income. This section discusses details of the methods used in this paper.

Measuring Childhood Poverty

In this paper, the poverty line adopted is the "poverty threshold" set by the United States Census Bureau, which is measured at the level of household, and differs based on family size, and the gender and age of members. According to the U.S.

Census Bureau (2017), the poverty threshold of United States in 2016 was $24,339 for a two-adults and two-child family.

In this analysis, $Thres_{it}$ refers to individual i's corresponding poverty threshold set by the United States Census Bureau, in the year *t*, in terms of his/her family characteristics. Whether individual *i* at year *t* is in poverty or not is denoted as Pov_{it}, and refers to family income in year *t* of individual *i*. Thus, $Pov_{it} = 1$ when $Inc_{it} < Thres_{it}$. This indicates the individual is poor at year *t*. Otherwise, $Pov_{it} = 0$.

Poverty can be distinguished as persistent poverty, defined as those who "never emerged from poverty," and transient poverty, defined as those who "move in and out of poverty from year to year" (Haughton & Khandker, 2009, p. 214). Prior research measured poverty by tabulating the percentage of individuals with income lower than the poverty threshold in x out of t time periods, to assess persistent poverty (poor all or most of the time), and transient poverty (poor in just a few time periods) (Duncan, Coe, & Hill, 1984; Hill, 1981; Rodgers & Rodgers, 1993).

This paper specifically investigates poverty that emerged in childhood (under 18 years old). After defining the poverty status of an individual for each year, I further distinguish the entire childhood economic situation into four categories, based on different durations.

1. Persistent childhood poverty: Duncan, Coe, and Hill (1984) define persistent poverty as being poor for eight years or more in ten years. This research defines childhood persistent poverty as an individual being poor most of time before age 18. As in the dataset used in this research, some individuals do not have 18 years of data. Meanwhile, a very limited number of individuals' income in the dataset is below the poverty line every single year while they were under 18 years old. To make sure the study contains enough data for this group, this paper set the cut off line for persistent poverty as 70% of the time. Thus, this analysis defines persistent poverty as an individual being poor for more than 70% of the time before age 18. I use Per_pov_{it} to indicate persistent poverty. $Per\_pov_{it} = 1$ if:

$$\frac{\sum_{j=0}^{18} Pov_{ij}}{n_i} > 0.7$$

Per_pov_{it} = 0 otherwise. Here, is the poverty status of individual *i* at age *j*, and refers to individual *i*'s total number of years in childhood.

2. Chronic transient poverty of childhood: This research defines chronic transient poverty as an individual experienced poverty during more than half the time of childhood, excluding the individuals experiencing persistent poverty. For chronic transient poverty, I define it as an individual being poor for 50% to 70% of their childhood. $Chron\_pov_{it}$ is used for chronic transient poverty, and it equals 1 when:

$$0.5 \leq \frac{\sum_{j=0}^{18} Pov_{ij}}{n_i} \leq 0.7$$

Otherwise, $Chron\_pov_{it} = 0$.

3. Non-chronic transient poverty: Non-chronic transient poverty is defined as an individual being poor in childhood for less than half of the time, excluding the individuals who are not poor. In our analysis, under age 18, if the individual lives in poverty for 10% to 50% of their childhood, they are considered to be non-chronic poor. I use $Non\_Chron\_pov_{it}$ as indicator and it equals 1 if:

$$0.1 < \frac{\sum_{j=0}^{18} Pov_{ij}}{\mathrm{n}_i} < 0.5$$

Otherwise, it equals zero.

4. Non-poor childhood: A non-poor childhood covers individuals who are not poor before age 18. However, as there are very few individuals who are not poor at all in 18 years, to make sure the study contains enough data for this group, I set the cutoff line as 10% of the time. An individual is considered not poor if he or she was poor no more than 10% of the time before age 18. In this paper, I use Non_pov_{it} indicating non-poor children. $Non\_pov_{it} = 1$ when:

$$\frac{\sum_{j=0}^{18} Pov_{ij}}{n_i} \leq 0.1$$

Otherwise, it equals zero.

Modeling Approach

This study investigates the consequences of childhood poverty on academic achievement, criminal behavior, and adult earnings. For continuous dependent variables (schooling years), this analysis uses ordinary least squared (OLS); for binary dependent variables (whether an individual was ever arrested), logistic models are applied. For adult earnings, I use a Mincer wage function. The different models are set out more fully below.

Schooling Model

Years of school is a continuous variable, based on previous studies (Brooks-Gunn & Duncan, 1997; Haveman & Wolfe, 1994; Teachman et al., 1997). The following model is used to analyze the impact of childhood poverty on schooling:

$$Y_i = \alpha + \beta_1 Per\_pov_i + \beta_2 Chron\_pov_i + \beta_3 Non\_Chron\_pov_i + \beta_4 Z_i + \varepsilon_i \quad (1)$$

where Y_i indicates completed schooling years. Per_pov_i, $Chron\_pov_i$ and $Non\_Chron\_pov_i$ are dummy variables of persistent poverty, chronic transient poverty, and non-chronic transient poverty. Z_i refers to other controlling factors related to the dependent variable, including gender, age, family size, and region; and ε_i is the random term.

Model of Arrest

For the logistic model, the log odds of the outcome are modeled as a linear combination of a series of predictors. The logistic model is used in this analysis when dependent variable whether an individual is arrested or not:

$$logit\,[Pr(Y_i = 1)] = \beta_1 Per\_pov_i + \beta_2 Chron\_pov_i + \beta_3 Non\_Chron\_pov_i + \beta_4 Z_i + \varepsilon_i \quad (2)$$

Here Y_i indicates whether individual *i* has been arrested or not.

Mincer Wage Function

The Mincer earnings function (Mincer, 1958) explains how schooling and work experience affect one's income, using a two-step procedure: (1) Identify individuals who have earnings; (2) Given earnings, using the following model to examine the factors that explain earnings:

$$lny_i = ln\, y_0 + \gamma S_i + \beta_1 X_i + \beta_2 X_i^2 + \varepsilon_i \quad (3)$$

Here, y refers to earnings, y_0 is earnings without education and experience, S refers to the number of years of schooling, and X is years of labor market experience. Further, to avoid selection bias, the Heckman model is introduced to conduct the test.

This paper augments the basic Mincer Wage equation to allow for the effect of childhood poverty, which gives:

$$lny_i = lny_0 + \gamma S_i + \beta_1 X_i + \beta_2 X_i^2 + \beta_3 Per\_pov_i + \beta_4 Chron\_pov_i + \beta_5 Non\_Chron\_pov_i + \beta_6 Z_i + \varepsilon_i \quad (4)$$

Here, y_i indicates the earnings of individual i in adulthood, S_i refers to the number of years of schooling, and X_i is years of labor market experience. Per_pov_i, $Chron\_pov_i$ *and* $Non\_Chron\_pov_i$ are dummy variables of childhood poverty, and Z_i are other related factors.

Data Description

The data used in this study comes from the Panel Study of Income Dynamics (PSID) from 1968 to 2013. This is a longitudinal survey directed by University of Michigan annually, which began in 1968. The survey contains a nationally representative sample of individuals from more than 5,000 households in the United States. The dataset covers numerous topics including employment, income, wealth, expenditures, criminal behavior, health, marriage, child development, and education. For the poverty threshold, this paper uses 1968–2013 poverty thresholds from United States Census Bureau.

In this paper, I built datasets based on PSID and focused on individuals who have at least 10 years of family income data in childhood. The target study sample consists of 11,596 individuals in 2013. To avoid sample selection bias, I compare a variety of variables including gender, family size and region between the

target sample and the entire PSID sample. Also, I conducted a *t*-test to compare the mean between the target sample and the entire PSID sample. Table 1 reports the comparison results, and it shows that the descriptive measures across these two datasets are quite consistent. Although the statistical results are significant, it is probably due to the large sample size.

Further, I pick region variables to reweight the sample. To reweight the sample, I used the ratio of North, North Central, South, and West in the entire dataset to establish weights and apply them to the sample data. Table 2 shows the comparison between full dataset samples after reweighting; as shown in the table, reweighting does not improve the variables other than region.

The distribution of childhood poverty in the United States for 1968–2013, 1968–2005 and 1968–1992 is reported in Table 3. As shown in the table, before 2013, among the 11,596 individuals, 5,032 experienced childhood poverty; 12.8% experienced persistent poverty in childhood (>70% time poor); 8.1% had chronic poverty during childhood (50–70% time poor); and 21.4% faced non-chronic transient poverty (10–50% time poor). In addition, the table shows that the percent of childhood poverty before 2005 and 1992 are quite similar to that of 2013, which is possible as the childhood poverty rate in the United States has been quite stable over the past several decades.

In this paper, I further use regressions to study the lasting impact of childhood poverty on education, criminal behavior, and earnings, respectively. Tables 4 to 6 provide detailed descriptions of the dependent and independent variables used in these models. From Table 4, for the schooling model, the dependent variable used is total number of years completed before 2013, thus, I use corresponding independent variables from 2013, including different type of childhood, gender, age, family size and region variables. For the model of arrest, the latest data available for arrests are from 1992, so I use the independent variable from 1992. And, the latest available income data are from 2005, thus, independent variables from the same year are applied to the Mincer wage function model. Also, because the paper examines the long-term impact of childhood poverty on adulthood, the cutoff of age used in this paper is 18. In this case, the education model contains 11,588 individuals. The criminal behavior model and Mincer wage function contain 5,116 and 9,638 samples, respectively.

Table 1. Descriptive Measures between Entire Dataset and Target Study Sample, 2013

	Entire Dataset			Target Study Sample			t-test
Variable	N	Mean	SD	N	Mean	SD	
Gender	75,251	0.50	0.50	11,596	0.51	0.50	4.09
Family Size	75,134	3.90	1.99	11,596	3.48	1.76	-24.96
North	75,248	0.14	0.34	11,596	0.13	0.34	-2.50
North Central	75,248	0.20	0.40	11,596	0.23	0.42	7.14
South	75,248	0.45	0.50	11,596	0.49	0.50	9.64

Table 2. Comparison between Entire Dataset and Reweight Target Study Sample, 2013

	Entire Dataset			Target Study Sample		
Variable	N	Mean	SD	N	Mean	SD
Gender	75,251	0.50	0.50	11,596	0.51	0.50
Family Size	75,134	3.90	1.99	11,596	3.48	1.78
North	75,248	0.14	0.34	11,596	0.14	0.34
North Central	75,248	0.20	0.40	11,596	0.20	0.40
South	75,248	0.45	0.50	11,596	0.45	0.50

Table 3. Distribution of Childhood Poverty in the United States

	1968- 2013		1968-2005		1968-1992	
Type of Poverty	Number	Percentage	Number	Percentage	Number	Percentage
Persistent poverty	1,486	12.8%	1,377	13%	1,082	13.4%
Chronic poverty	943	8.1%	847	8%	646	8%
Non-chronic transient poverty	2,603	22.5%	2,382	22.5%	1,844	22.9%
Non-Poor	6,564	56.6%	5,994	56.5%	4,485	55.7%
Total	11,596	100%	10,600	100%	8,057	100%

Notes. Data source is PSID data between 1968-2013

Table 4. Variables Description of Schooling Model

Variable Name	Variable Explanation	N	Mean	SD	Min	Max
Dependent Variable						
Yr_school_13	Years of school completed before 2013	10,432	11.78	4.43	0	17
Independent Variables						
Dummy Variables of Childhood poverty						
Per_pov13	Per_pov13=1 if individual experienced persistent childhood poverty before 2013	11,588	0.13	0.33	0	1
Chron_pov13	Chron_pov13=1if individual experienced chronic transient childhood poverty before 2013	11,588	0.08	0.27	0	1
Non_chron_pov13	Non_chron_pov13=1 if individual experienced non-chronic transient childhood poverty before 2013	11,588	0.22	0.42	0	1
Non_pov13	Non_poor13 =1 if individual dose not experienced childhood poverty before 2013	11,588	0.57	0.50	0	1
Personal and family variables						
Gender	Gender =1 if male	11,588	0.50	0.50	0	1
Age13	Individual's age in 2013	11,588	36.66	10.11	18	58
Fmsize13	Family size in 2013	11,588	3.47	1.76	1	16
Dummy Variables of Region						
North_13	Equals 1.if individual lives in north region in 2013	11,588	0.13	0.34	0	1
North_central_13	Equals 1 if individual lives in north central region in 2013	11,588	0.23	0.42	0	1
South_13	Equals 1 if individual lives in south region in 2013	11,588	0.49	0.50	0	1
West_13	Equals 1 if individual lives in west region in 2013	11,588	0.15	0.36	0	1

Table 5. Variables Description of Model of Arrest

Variable Name	Variable Explanation	N	Mean	SD	Min	Max
Dependent Variable						
Arrest_92	Dummy variable, Arrest92=1 if individual has been arrested before 1992	3,301	0.11	0.32	0	1
Independent Variables						
Dummy Variables of Childhood poverty						
Per_pov92	Per_pov92=1 if individual experienced persistent childhood poverty before 1992	5,116	0.14	0.34	0	1
Chron_pov92	Chron_pov92=1if individual experienced chronic transient childhood poverty before 1992	5,116	0.09	0.28	0	1
Non_chron_pov92	Non_chron_pov92=1 if individual experienced non-chronic transient childhood poverty before 1992	5,116	0.24	0.43	0	1
Non_pov92	Non_poor92 =1 if individual dose not experienced childhood poverty before 1992	5,116	0.53	0.50	0	1
Personal and family variables						
Gender	Dummy variable, Gender =1 if male	5,116	0.50	0.50	0	1
Ag_92	Individual's age at 1992	5,116	25.41	4.37	18	34
Fmsize_92	Family size at 1992	5,116	3.68	1.93	1	16
Dummy Variables of Region						
North_92	North_92=1 if individual lives in north region at 1992	5,116	0.14	0.35	0	1
North_central_92	North_central_92=1 if individual lives in north central region at 1992	5,116	0.22	0.41	0	1
South_92	South_92=1 if individual lives in south region at 1992	5,116	0.49	0.50	0	1
West 92	West 92=1 if individual lives in west region at 1992	5.116	0.15	0.36	0	1

Table 6. Variables Description of Mincer Wage Model

Variable Name	Variable Explanation	N	Mean	SD	Min	Max
Dependent Variable						
Inc_05	Individual's earnings at 2005	3,338	34,685	46660.2	5.5	1,000,000
Independent Variables						
Education and Experience Variables						
Yr_school_05	Years of school completed before 2005	8,651	11.14	4.53	0	17
Experience_05	Years of working experience at 2005	8,651	14.15	8.52	0	40
Dummy Variables of Childhood poverty						
Per_pov05	Per_pov05=1 if individual experienced persistent childhood poverty before 2005	8,651	0.13	0.34	0	1
Chron_pov05	Chron_pov05=1if individual experienced chronic transient childhood poverty before 2005	9,638	0.08	0.27	0	1
Non_chron_pov05	Non_chron_pov05=1 if individual experienced non-chronic transient childhood poverty before 2005	9,638	0.23	0.42	0	1
Non_pov05	Non_poor05 =1 if individual dose not experienced childhood poverty before 2005	9,638	0.56	0.50	0	1
Personal and family variables						
Gender	Gender =1 if male	9,638	0.50	0.50	0	1
Age05	Individual's age at 2005	9,638	31.66	8.23	18	50
Fmsize05	Family size at 2005	9,638	3.64	1.77	1	16
Dummy Variables of Region						
North_05	North13=1 if individual lives in north region at 2005	9,638	0.13	0.34	0	1
North_central_05	North_central=1 if individual lives in north central region at 2005	9,638	0.23	0.42	0	1
South_05	South=1 if individual lives in south region at 2005	9,638	0.49	0.50	0	1
West_05	West=1 if individual lives in west region at 2005	9,638	0.15	0.36	0	1

Results

Influence of Childhood Poverty on Education Achievements

Table 7 reports the regression results for the education model. It illustrates the significant negative impact of childhood poverty on the number of school years completed, which is consistent with previous studies (Brooks-Gunn & Duncan, 1997; Teachman et al., 1997). Also, the results show that different durations of childhood poverty have different influences. While both long-term and short-term poverty show negative effects on education, a longer time of childhood poverty has a greater negative impact on completed schooling.

According to Table 7, if a person suffers from persistent childhood poverty (70% time poor in childhood), it will lead to a decrease in years of school completed by 1.69 years relative to someone who did not grow up in poverty. If a person experiences chronic transient poverty (50% to 70% poor time) in childhood, it is associated with 1.31 years reduction of completed schooling. However, if an individual has experienced non-chronic transient childhood poverty (10% to 50% poor time in childhood), it will affect the number of school years completed by 0.76. This possibly can be explained as the longer the time an individual is poor in childhood, the less likely his/her family have sufficient money to support education, which leads to fewer school years completed. Meanwhile, the regression results also indicate that other factors beyond childhood poverty, including gender and family size, are also associated with education attainment. Compared with girls, boys complete fewer years of school. In addition, living in a larger family is associated with a decrease in schooling years.

Influence of Childhood Poverty on Criminal Behavior

The logistic model is used to assess the impact of childhood poverty on criminal behavior, and these results are shown in Table 8. The dependent variable used in this model is whether the individual was arrested in 1992. Prior research has shown a relationship between childhood poverty and more criminal behavior (Bjerk, 2004; Duncan et al., 1994; Duncan et al., 2010;

Jarjoura et al., 2002); poverty is related to less education and lower-paid employment, and these then lead to crimes. The regression results are, not surprisingly, consistent with this.

As illustrated in Table 8, the existence of childhood poverty increases the likelihood of being arrested. However, while none of the prior research studied the differential impact of different lengths of childhood poverty on criminal behavior, this analysis shows that although all types of childhood poverty are associated with a higher risk of arrest, the longer the childhood poverty, the stronger the impact, especially for persistent childhood poverty. From Table 8 we can see the odds ratio of persistent poverty is 0.27 higher than that of chronic poverty and 0.39 higher than the odds ratio of non-chronic transient poverty.

Influence of Childhood Poverty on Adulthood Income

The augmented Mincer wage function is reported in Table 9. The results show that childhood poverty has a significant negative association with earnings. This has also been shown in prior studies (Brooks-Gunn & Duncan, 1997; Duncan et al., 2010; Holzer et al., 2008).

Also, according to Table 8, the different lengths of childhood poverty have different impacts. When an individual grows up in poverty more than 70% time in childhood (persistent childhood poverty), he or she will make 53% and 22% less income compared with an individual who does not experience poverty or chronic transient poverty in childhood, respectively.

In addition, Table 9 shows that compared with non-poor individuals, when an individual experiences chronic transient poverty in childhood, he/she will make 30% less. However, when an individual grows up in poverty less than half of time in childhood (non-chronic poverty), it will not have a significant impact on adulthood income. Meanwhile, the results show that other factors will affect income: men earn more compared with women; and coming from a larger household is related to lower income.

However, because the Mincer wage function is only based on the sample of those who have jobs, it may reflect selection bias. To avoid this, I conducted a Heckman procedure of the wage function. The Heckman procedure can be identified in

two steps: In the first step, a probit model is built with the following form:

$$Prob(work = 1|Z) = \phi(Z\gamma) \quad (6)$$

Here, work refers to whether an individual participates in the labor force or not, *work* = 1 if the respondent participates in labor force; *Z* is a vector of explanatory variables. I use health condition (health) as the explanatory variable that is related to employment, but not income: when health = 1, the individual has a poor health condition. Then, the second step corrects the Mincer wage function by adding the predicted probabilities from the first stage as an extra explanatory variable into the regression. The Heckman procedure results are shown in Table 10. As can be seen, the Mills ratio is significant at the 5% confidence level, which indicates the presence of selection bias, and justifies making the correction. According to the regression results of the Heckman procedure, there are strong negative relationships between persistent childhood poverty, chronic persistent poverty, and labor force participation. Additionally, like Table 8, the Heckman procedure indicates that when an individual experiences childhood poverty less than 50% time in childhood (non-chronic transient poverty), it will not have a significant impact on adult earnings, provided the person is working. In addition, as shown in Table 10, men earn more than women, and age positively impacts an individual's earnings. Living in a household with a larger number of family members is associated with lower income in adulthood.

In the first step of the Heckman procedure, the dependent variable used is *Work_05*, which is dummy variable that equals one if the individual worked in 2005. An additional independent variable included here is *health_05*, which is a self-reported dummy variable which equals 1 when the individual reported having poor health in 2005; this is assumed to affect labor force participation, but not earnings. As demonstrated in Table 10, being poor in childhood, especially persistently poor, reduces a person's likelihood of working. In addition, larger family size and poor health also are negatively associated with the likelihood of working. Also, health is consistently shown to be an

outcome of poverty itself in prior studies (Duncan et al., 2010; Evans & Kim, 2007).

Results Discussion

Regression results report the enduring influences of different durations of childhood poverty; the results show that different durations of poverty in childhood will have different impacts. Persistent childhood poverty is associated with 1.69 years reduction in completed school years, higher risk of arrest, and 52% lower earnings, compared with an individual who is not poor in childhood. One possible explanation for the impact of persistent poverty is that longer time in poverty will lead to lack of adequate education and resources, and this will prevent them from obtaining well-paid employment, and lead to behaviour problems as well. Also, the results show that even shorter-term childhood poverty will have enduring influence, both chronic transient poverty and non-chronic will result in reduction of completed school years by 1.31 years and 0.76 years respectively, and are associated with higher risk of being arrested. However, when an individual grows up in poverty less than half of time in childhood (non-chronic poverty), it will not have a significant impact on earnings.

However, one limitation of this analysis is that academic achievement, criminal behaviour and earnings may not be a complete measurement for an individual's adult attainment. Other factors, such as health conditions in adulthood, may also be influenced by childhood poverty. Nevertheless, due to lack of health data in PSID, this research is not able to investigate the impact of childhood poverty on future health.

Table 7. Enduring Influence of Childhood Poverty on Education

Dependent Variables: yr_school_13		
Independent Variables	**Coefficient**	**Standard Error**
Dummy Variables of Childhood poverty		
Per_pov13	-1.69***	0.13
Chron_pov13	-1.31***	0.16
Non_chron_pov13	-0.76***	0.10
Personal and family variables		
Gender	-0.62***	0.08
Age13	0.02***	0.004
Fmsize13	-0.68***	0.02
Dummy Variables of Region		
North	0.59***	0.16
North_central	0.47***	0.14
South	0.28**	0.12
Intercept	13.74***	0.20
Adjusted R^2	0.104	
N	10,432	

Notes.

*, **, *** : the coefficient is significant under $\alpha = 0.1, \alpha = 0.05, \alpha = 0.01$ respective

West region is used as reference region in the model

Estimation method: OLS

Table 8. Influence of Childhood Poverty on Criminal Behavior (Logistic Model)

Dependent Variables: Arrest_92		
Independent Variables	**Coefficient**	**Standard Error**
Dummy Variables of Childhood poverty		
Per_pov92	1.03***	0.16
Chron_pov92	0.51**	0.21
Non_chron_pov92	0.35**	0.14
Personal and family variables		
Gender	1.51***	0.13
Age_92	0.02	0.01
Fmsize_92	-0.07**	0.35
Dummy Variables of Region		
North_92	-0.18	0.23
North_central_92	0.40**	0.19
South_92	0.01	0.18
Intercept	-3.65***	0.43
Pseudo R2	0.09	
N	3,301	

Notes. *, **, ***: the coefficient is significant under $\alpha = 0.1, \alpha = 0.05, \alpha = 0.01$ respectively

West region is used as reference region in the model

Table 9. Impact of Childhood Poverty on Income (Augmented Mincer Wage Function)

Dependent Variables: Ln(inc_05)		
Independent Variables	**Coefficient**	**Standard Error**
Education and Experience Variables		
Yr_school_05	-0.04	0.30
Experience_05	-0.11	0.30
Experience_05 squared	-0.003***	0.0003
Dummy Variables of Childhood poverty		
Per_pov05	-0.52***	0.08
Chron_pov05	-0.30***	0.10
Non_chron_pov05	-0.03	0.06
Personal and family variables		
Gender	0.44***	0.04
Age_05	0.23	0.30
Fmsize_05	-0.06***	0.14
Dummy Variables of Region		
North_05	0.17**	0.08
North_central_05	0.13*	0.07
South_05	0.04	0.06
Intercept	5.03***	1.80
F-test	83.12	
N	2,913	

Notes. *, **, *** : the coefficient is significant under $\alpha = 0.1, \alpha = 0.05, \alpha = 0.01$ respectively

West region is used as reference region in the model

Table 10. Two-step Heckman Procedure for Mincer Wage function

Dependent Variables: Ln(inc_05)		
Independent Variables	**Coefficient**	**Standard Error**
Education and Experience Variables		
Yr_school_05	-0.30	0.26
Experience_05	-0.51*	0.29
Experience_05 squared	-0.003***	0.0006
Dummy Variables of Childhood poverty		
Per_pov05	-0.74***	0.13
Chron_pov05	-0.45***	0.13
Non_chron_pov05	-0.08	0.07
Personal and family variables		
Gender	0.35***	0.06
Age_05	0.61**	0.28
Fmsize_05	-0.13***	0.03
Dummy Variables of Region		
North_05	0.09	0.09
North_central_05	0.23**	0.09
South_05	-0.11	0.09
Intercept	0.60	2.23
Dependent Variables: Work_05		
Independent Variables	**Coefficient**	**Standard Error**
Education and Experience Variables		
Yr_school_05	-0.26*	0.15
Experience_05	-0.46***	0.15
Experience_05^2	0.001***	0.0002
Dummy Variables of Childhood poverty		
Per_pov05	-0.29***	0.05
Chron_pov05	-0.25***	0.06
Non_chron_pov05	-0.09**	0.04
Personal and family variables		
Gender	-0.10***	0.03
Age_05	0.41***	0.15
Fmsize_05	-0.09***	0.01
Dummy Variables of Region		
North_05	-0.09	0.06
North_central_05	0.15***	0.05
South_05	-0.17***	0.05
Dummy Variables of Health		
Health_05	-0.32**	0.15
Intercept	-3.78***	0.89
Mills Ratio	1.17**	0.50
Wald Chi	870.48	
N	8,684	

Notes. *, **, *** : the coefficient is significant under $\alpha = 0.1, \alpha = 0.05, \alpha = 0.01$ respectively

Conclusion

Although there are numerous papers regarding childhood poverty, the studies on the impact of different durations of childhood poverty are very few and are dated. Also, as poverty thresholds in the United States differ by family size and other characteristics, prior studies' measurement of childhood poverty, by just comparing average income with a fixed poverty line, may lead to bias. This paper deals with the prior poverty measurement bias issue in earlier research by establishing a detailed classification of childhood poverty using a comparison between family income and the corresponding year's poverty threshold based on different family characteristics from the Census Bureau. The distribution of childhood poverty shows that, between 1968 to 2013, among the 11,596 individuals in the PSID sample, 12.8% experienced persistent poverty in childhood (>70% time poor); 8.1% experienced chronic transient poverty during childhood (50–70% time poor); and 21.4% experienced non-chronic transient poverty (10–50% time poor).

I further analyzed how different durations of childhood poverty affected academic achievement, criminal behavior, and earnings. The regression results showed that childhood poverty is strongly associated with fewer years of schooling and lower income. Also, being poor in childhood increases the likelihood of being arrested. In addition, the results show that different durations of childhood poverty have different lasting consequences. Compared with individuals who live less than half their time poor in childhood (non-chronic transient poverty), individuals who suffer from poverty for more than half their childhood, particularly those who have experienced persistent poverty (> 70% time of being poor under 18), are more likely to complete fewer years of schooling and stand a higher risk of committing a crime. In addition, persistent childhood poverty is associated with 52% and 22% reduction in earnings compared with non-poor and chronic transient childhood poverty, respectively.

Also, while no prior research studies the impact of short-term childhood poverty, this paper shows that both chronic transient poverty and non-chronic transient poverty are associated with fewer school years completed, and a higher risk of committing crime. However, while chronic transient

childhood poverty is associated with a 30% reduction in adult earnings, non-chronic transient poverty shows no significant effect on adult earnings.

Overall, this analysis underscores the importance in the United States of addressing childhood poverty, and especially persistent poverty. Meantime, the results indicate even non-persistent poverty (chronic transient poverty and non-chronic transient poverty) will have a negative impact on adult attainment, thus also merits attention.

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